

AMENDMENTS TO THE CLAIMS

Please CANCEL claims 5, 18, 29 and 35 without prejudice or disclaimer.

Please AMEND claims 1-4, 6, 12-14, 16, 19, 23-28, 30-34, 36-38, 42, 44, 45 and 49-52, as shown below.

The following is a complete list of all claims in this application.

1. (Currently Amended) A network switching device comprising:
an ingress module adapted configured to receive frames of data from a channel and store the frames of in one or more buffers, wherein each frame of data has one of a plurality of classes of service, and to store the data in one or more buffers; and one or more queues:
a forwarding module configured to enqueue each of the buffers to the one or more queues after the ingress module stores the data frames in one or more of the one or more buffers; and
a plurality of counters comprising one counter for each of the classes of service, wherein each of the counters is configured to store a count for the channel for a respective one of the classes of service, increment the count when the forwarding module enqueues one of the buffers storing the data of one of the frames having the respective class of service, and

decrement the count after the data stored in a buffer for a frame received from the channel and having the respective class of service is transmitted from the network switching device; and

an egress module adapted configured to exercise flow control on the channel for each of the classes of service when the number of the buffers storing frames of data received from the channel and having the class of service but not yet transmitted from the network switching device the count for the class of service exceeds a predetermined threshold for the class of service.

2. (Currently Amended) The network switching device of claim 1:

wherein, to exercise flow control for one of the classes of service, the egress module is further adapted configured to send a pause frame to the channel, and wherein the pause frame indicates the one of the classes of service.

3. (Currently Amended) The network switching device of claim 1:

wherein the egress module is further adapted configured to terminate flow control on the channel for each of the classes of service when the number of the buffers storing frames of data having the class of service but not yet transmitted from the network switching device the count for the class of service falls below a further predetermined threshold for the class of service.

4. (Currently Amended) The network switching device of claim 3:

wherein, to terminate flow control for one of the classes of service, the egress module is further adapted configured to send a pause release frame to the channel, and wherein the pause release frame indicates the one of the classes of service.

5. (Cancelled)

6. (Currently Amended) The network switching device of claim [[5]] 1:
wherein the egress module is further adapted configured to terminate flow control on the channel for each of the classes of service when the count for the class of service falls below a further predetermined threshold for the class of service.

7. (Original) An integrated circuit comprising the network switching device of claim 1.

8. (Original) A network switch comprising the network switching device of claim 1.

9. (Original) An output-queued network switch comprising the network switching device of claim 1.

10. (Original) The network switching device of claim 1, further comprising:
a memory comprising the buffers.

11. (Original) An integrated circuit comprising the network switching device of claim 10.

12. (Currently Amended) The network switching device of claim 1, further comprising:

a reserve module adapted configured to reserve one or more of the buffers to the channel;

wherein the a pause threshold for the channel is a function of at least one of the group consisting of

the number of the buffers reserved to the channel; and
the number of the buffers neither reserved nor enqueued.

13. (Currently Amended) The network switching device of claim 3, further comprising:

a reserve module adapted configured to reserve one or more of the buffers to the channel;

wherein the a pause release threshold for the channel is a function of at least one of the group consisting of

the number of the buffers reserved to the channel; and
the number of the buffers neither reserved nor enqueued.

14. (Currently Amended) A network switching device comprising:

ingress module means for receiving the frames of data from a channel, wherein each frame of data has one of a plurality of classes of service, and to store the data in one or more buffers; and

one or more queue means for queuing the one or more buffers;

forwarding module means for enqueueing each of the one or more buffers to one or more of the one or more queue means after the ingress module means stores the data of one of the frames in the one or more buffers;

a plurality of counter means comprising one counter means for each of the classes of service, each of the counter means for:

storing a count for the channel for a respective one of the classes of service,

incrementing the count when the forwarding module enqueues one of the buffers storing the data from one of the frames having the respective class of service, and

decrementing the count after the data stored in a buffer for a frame received from the channel and having the respective class of service is transmitted from the network switching device; and

egress module means for exercising flow control on the channel for each of the classes of service when the number of the buffers storing frames of data received from the channel and having the class of service but not yet transmitted from the network switching device the count for the class of service exceeds a predetermined threshold for the class of service.

15. (Original) The network switching device of claim 14:

wherein, to exercise flow control for one of the classes of service, the egress module means sends a pause frame to the channel; and
wherein the pause frame indicates the one of the classes of service.

16. (Currently Amended) The network switching device of claim 14:

wherein the egress module means terminates flow control on the channel for each of the classes of service when ~~the number of the buffers storing frames of data having the class of service but not yet transmitted from the network switching device~~ the count for the class of service falls below a further predetermined threshold for the class of service.

17. (Original) The network switching device of claim 16:

wherein, to terminate flow control for one of the classes of service, the egress module means sends a pause release frame to the channel, and wherein the pause release frame indicates the one of the classes of service.

18. (Cancelled)

19. (Currently Amended) The network switching device of claim [[18]] 14:

wherein the egress module means terminates flow control on the channel for each of the classes of service when the count for the class of service falls below a further predetermined threshold for the class of service.

20. (Original) An integrated circuit comprising the network switching device of claim 14.

21. (Original) A network switch comprising the network switching device of claim 14.

22. (Original) An output-queued network switch comprising the network switching device of claim 14.

23. (Currently Amended) The network switching device of claim 14, further comprising: reserve module means for reserving one or more of the buffers to the channel;

wherein the a pause threshold for the channel is a function of at least one of the group consisting of:

the number of the buffers reserved to the channel; and
the number of the buffers neither reserved nor enqueued.

24. (Currently Amended) The network switching device of claim 16, further comprising:

reserve module means for reserving one or more of the buffers to the channel;
wherein the a pause release threshold for the channel is a function of at least one of the group consisting of

the number of the buffers reserved to the channel; and
the number of the buffers neither reserved nor enqueued.

25. (Currently Amended) A method comprising:
- receiving frames of data from a channel, wherein each frame of data has one of a plurality of classes of service;
- storing the data in one or more buffers; and
- enqueueing each of the buffers to one or more output queues after storing the data of one of the frames in the buffer;
- storing a count for the channel for each of the classes of service;
- incrementing the count for one of the classes of service enqueueing one of the buffers storing the data from one of the frames received from the channel and having the one of the classes of service;
- decrementing the count for one of the classes of service after the data stored in a buffer for a frame received from the channel and having the one of the classes of service is transmitted; and
- exercising flow control on the channel for each of the classes of service when the number of the buffers storing frames of data received from the channel and having the class of service but not yet transmitted from the network switch the count for the one of the classes of service exceeds a predetermined threshold for the class of service.

26. (Currently Amended) The method of claim 25, wherein exercising flow control for one of the classes of service comprises:

sending a pause frame to the channel, wherein the pause frame indicates the one of the classes of service to be paused.

27. (Currently Amended) The method of claim 25, further comprising:
terminating flow control on the channel for each of the classes of service when
~~the number of the buffers storing frames of data having the class of service but not yet transmitted from the network switch the count for the one of the classes~~ falls below a further predetermined threshold for the class of service.

28. (Currently Amended) The method of claim 27, wherein terminating flow control for one of the classes of service comprises:

sending a pause release frame to the channel, and wherein the pause release frame indicates the one of the classes of service to be released.

29. (Cancelled)

30. (Currently Amended) The method of claim [[29]] 25, further comprising:
terminating flow control on the channel for each of the classes of service when the count for the class of service falls below a further predetermined threshold for the class of service.

31. (Currently Amended) A computer readable medium having a stored computer program embodying instructions executable by a processor to control

computer, which, when executed by the computer, cause the computer to control an apparatus having an ingress module connected to a channel and an egress module connected to the channel, the computer program instructions comprising:

instructions for storing data in one or more buffers for frames of the data received by the ingress module from the channel, wherein each frame has one of a plurality of classes of service; and

instructions for enqueueing each of the buffers to one or more output queues
after storing the data for one of the frames in the buffer;

instructions for storing a count for the channel for each of the classes of service;

instructions for incrementing the count for one of the classes of service when
enqueueing one of the buffers storing the data for one of the frames received from the
channel and having the one of the classes of service, and

instructions for decrementing the count for one of the classes of service after the
data stored in a buffer for a frame received from the channel and having the one of the
classes of service is transmitted; and

instructions for causing the egress module to exercise flow control on the
channel for each of the classes of service when ~~the number of the buffers storing the~~
~~data for frames received by the ingress module from the channel and having the class~~
~~of service but not yet transmitted from the apparatus the count for each class of service~~
exceeds a predetermined threshold for the class of service.

32. (Currently Amended) The computer program readable medium of claim 31, wherein the instructions for causing the egress module to exercise flow control for one of the classes of service comprises:

instructions for causing the egress module to send a pause frame to the channel, wherein the pause frame indicates the one of the classes of service to be paused.

33. (Currently Amended) The computer program readable medium of claim 31, the instructions further comprising:

instructions for causing the egress module to terminate flow control on the channel for each of the classes of service when the number of the buffers storing the data for frames having the class of service but not yet transmitted from the apparatus the count for each class of service falls below a further predetermined threshold for the class of service.

34. (Currently Amended) The computer program readable medium of claim 33, wherein the instructions for causing the egress module to terminate flow control for one of the classes of service comprises:

instructions for causing the egress module to send a pause release frame to the channel, wherein the pause release frame indicates the one of the classes of service to be released.

35. (Cancelled)

36. (Currently Amended) The computer program readable medium of claim [[35]] 31, the instructions further comprising:

instructions for causing the egress module to terminate flow control on the channel for each of the classes of service when the count for the class of service falls below a further predetermined threshold for the class of service.

37. (Currently Amended) A network switching device comprising:
a plurality of counters for of a plurality of classes of service, respectively, each counter configured to:

store a count for a respective one of the classes of service;
increment the count when one of buffers storing one or more frames of data having the respective class of service is enqueued; and
decrement the count after the one or more frames of data stored in the one or more buffers is transmitted from the network switching device;
an egress module adapted configured to generate a pause frame indicating one or more of the classes of service to be paused when one or more counts for the one or more classes of service exceed a predetermined threshold for the one or more classes of service retrieve frames of data from a memory, and to transmit the frames of data to a channel, wherein each of the frames of data has one of a plurality of classes of service; and
an ingress module adapted configured to receive the a pause frame indicating one or more of the classes of service to be paused;

wherein, in response to the pause frame, the egress module is further adapted configured to cease to transmit the frames of data having the one or more classes of service to be paused, and

continue to transmit the frames of data not having the one or more classes of service to be paused.

38. (Currently Amended) The network switching device of claim 37:

wherein the egress module is further configured to generate a pause release frame indicating one or more of the classes of service to be released when one or more counts for the respective classes of service fall below the predetermined threshold for the respective classes of service;

wherein the ingress module is further adapted configured to receive a the pause release frame indicating one or more of the classes of service to be released;

wherein, in response to the pause release frame, the egress module is further adapted configured to resume transmitting the frames of data having the one or more classes of service to be released.

39. (Original) An integrated circuit comprising the network switching device of claim 37.

40. (Original) A network switch comprising the network switching device of claim 37.

41. (Original) An output-queued network switch comprising the network switch of claim 37.

42. (Currently Amended) The network switching device of claim 37, further comprising: a wherein the memory comprises comprising the buffers.

43. (Original) An integrated circuit comprising the network switching device of claim 42.

44. (Currently Amended) A network switching device comprising:
means for storing a plurality of counts for a plurality of classes of service,
respectively,

means for incrementing each count upon enqueueing one or more buffers storing
one or more frames of data, each of the frames of data having one of the classes of
service, and

means for decrementing each count after the one or more frames of data stored
in the one or more buffers are transmitted from the network switching device;

egress module means for generating a pause frame indicating one or more
classes of services to be paused when the one or more counts for the respective
classes of service exceed a predetermined threshold for the respective classes of
service; retrieving frames of data from a memory, and for transmitting the frames of data
to a channel, wherein each of the frames of data has one of a plurality of classes of
service; and

~~ingress module means for receiving a pause frame indicating one or more of the classes of service to be paused;~~

~~wherein, in response to the pause frame, the egress module means ceases means for ceasing to transmit the frames of data having the one or more of the classes of service to be paused in response to the pause frame, and continues to transmit the frames of data not having the one or more of the classes of service to be paused.~~

45. (Currently Amended) The network switching device of claim 44, further comprising:

means for generating wherein the ingress module means receives a pause release frame indicating one or more of the classes of service to be released when one or more counts for the respective classes of service fall below the predetermined threshold for the respective classes of service:

wherein, in response to the pause frame, the egress module means resumes means for resuming transmitting the frames of data having the one or more of the classes of service to be released.

46. (Original) An integrated circuit comprising the network switching device of claim 44.

47. (Original) A network switch comprising the network switching device of claim 44.

48. (Original) An output-queued network switch comprising the network switch of claim 44.

49. (Currently Amended) A method comprising:

storing a plurality of counts for a plurality of classes of service, respectively;

incrementing each count upon enqueueing one or more buffers storing one or

more frames of data, each frame of data having one of the classes of service;

decrementing each count after the one or more frames of data stored in the one

or more buffers and having the one of the classes of service are transmitted from the

network switching device;

transmitting frames of data to a channel, wherein each of the frames of data has

one of a plurality of classes of service;

generating a pause frame indicating that one or more of the classes of service

to be paused when one or more counts for the respective classes of service exceed a

predetermined threshold for the respective classes of service; and

receiving a pause frame indicating one or more of the classes of service to be

paused; and

in response to the pause frame,

ceasing to transmit the frames of data having the one or more classes of service

to be paused; and

continuing to transmit the frames of data not having the one or more classes of

service to be paused.

50. (Currently Amended) The method of claim 49, further comprising:
receiving generating a pause release frame indicating one or more of the classes
of service to be released when one or more counts for the respective classes of service
fall below a predetermined threshold for the respective classes of service; and
in response to the pause release frame, resuming transmitting the frames of data
having the one or more classes of service to be released.

51. (Currently Amended) A computer program readable medium having a
stored computer program embodying instructions, which, when executed by a computer,
cause the computer embodying instructions executable by a processor to control an
apparatus having an ingress module connected to a channel and an egress module
connected to the channel, the computer program instructions comprising:
instructions for storing a plurality of counts for a channel for a plurality of classes
of service, respectively;
instructions for incrementing each count upon enqueueing one or more buffers
storing one or more frames of data having the respective class of service;
instructions for decrementing each count after the one or more frames of data
stored in the one or more buffers and having the respective class of service is
transmitted from the network switching device;
causing the egress module to transmit frames of data to the channel, wherein
each of the frames of data has one of a plurality of classes of service; and

instructions for generating a pause frame indicating that one or more classes of services to be paused when one or more counts for the respective classes of service exceed a predetermined threshold for the respective classes of service;

in response to the ingress module receiving a pause frame from the channel, the pause frame indicating one or more of the classes of service to be paused,

instructions for causing the egress module to cease ceasing to transmit the frames of data having the one or more classes of service to be paused, and causing the egress module to continue to transmit the frames of data not having the one or more classes of service to be paused.

52. (Currently Amended) The computer program readable medium of claim 51, the instructions further comprising:

instructions for generating a pause release frame indicating that one or more of the classes of service to be released when one or more counts for the respective classes of service fall below the predetermined threshold for the respective classes of service; and

instructions for resuming transmitting the frames of data having the one or more classes of service to be released.

in response to the ingress module receiving a pause release frame from the channel, the pause release frame indicating one or more of the classes of service to be released, causing the egress module to resume transmitting the frames of data having the one or more classes of service to be released.